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Home Mechanics

AS AN AREA OF
INDUSTRIAL ARTS INSTRUCTION IN
PENNSYLVANIA PUBLIC SCHOOLS

SUBJECT AREAS

Automotive	Home Mechanics	Plastics
Ceramics	Metal Forming	Sheet Metal
Electricity	Metal Machining	Textiles
Graphic Arts	Planning	Woodworking

Bulletin 331E • 1952

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION • Harrisburg

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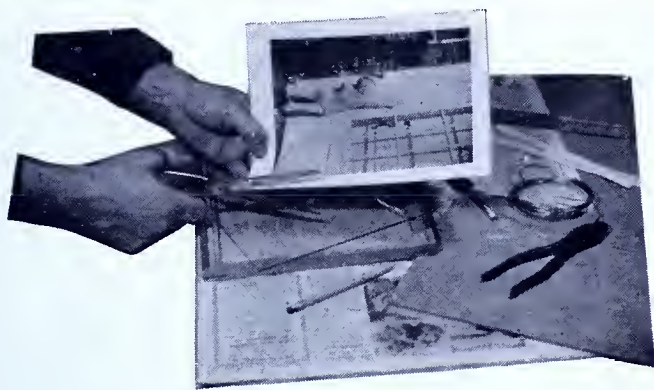
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Foreword_____



This bulletin is one of a series prepared to stimulate specific areas of instruction in the broad field of Industrial Arts Education. It is a supplement to *Industrial Arts in Pennsylvania*, Bulletin 331, published in September of 1951 by the Department of Public Instruction.

Instructors in Home Mechanics will familiarize boys and girls in our secondary schools with tools and materials commonly used in the home. Such instruction enables pupils to assist in better home maintenance and economical home improvement now and in the future.

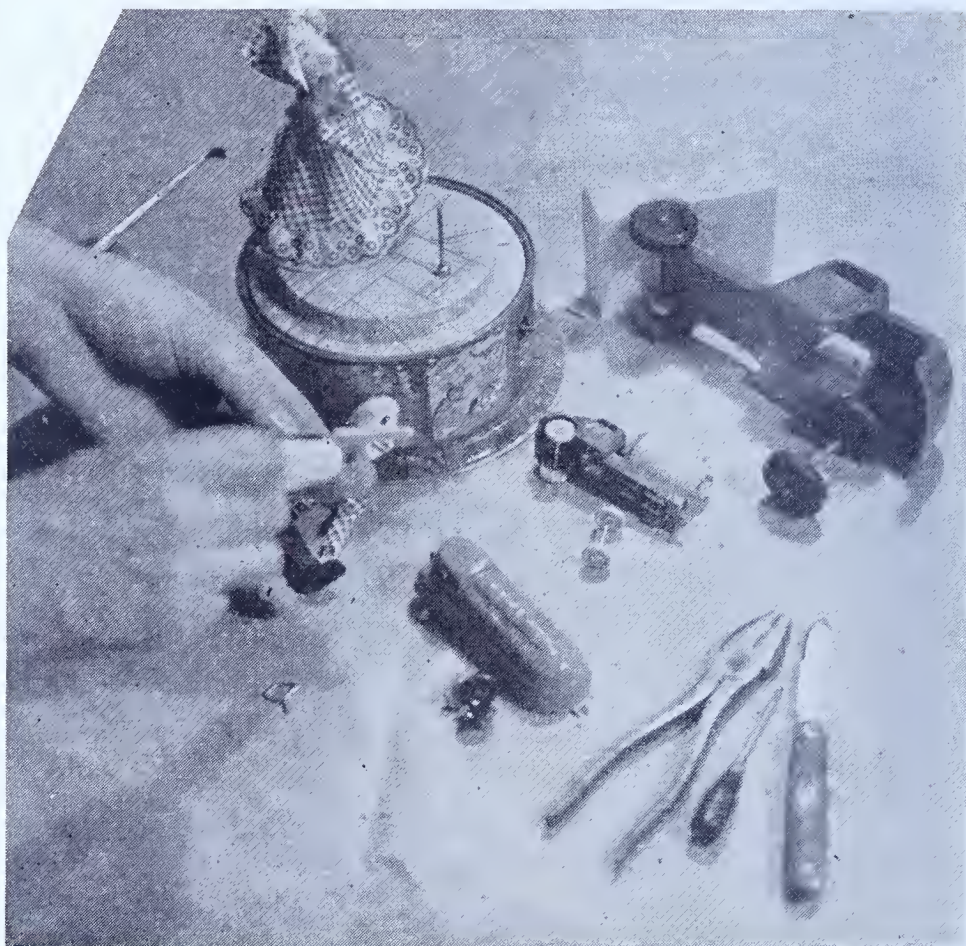
Home Mechanics was prepared by Robert Jacoby, Area Coordinator of Trade and Industrial Education under the supervision of Robert T. Stoner, Chief, Trade and Industrial Education, and under the general direction and guidance of Paul L. Cressman, Director of the Bureau of Instruction. Preliminary work on manuscript and layout planning were done by R. Randolph Karch, Adviser, Trade and Industrial Education. Photographs are the work of Lyle Weissenfluh, Adviser, Trade and Industrial Education.

This bulletin has been edited by Rachel S. Turner, Editor for the Department of Public Instruction.

Francis B. Hoar

Superintendent of Public Instruction

May 1952



Department of Public Instruction

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Introduction



BECAUSE of the differences in educational concepts, in backgrounds of the administrator and teacher, in variations in the time pupils spend in the activity, in amount of funds available for equipment and supplies, as well as in other factors, no attempt is made in this bulletin to set up a common course of study applicable to all situations, or to tell the teacher what to teach, how to teach, or what equipment he should have in his shop.

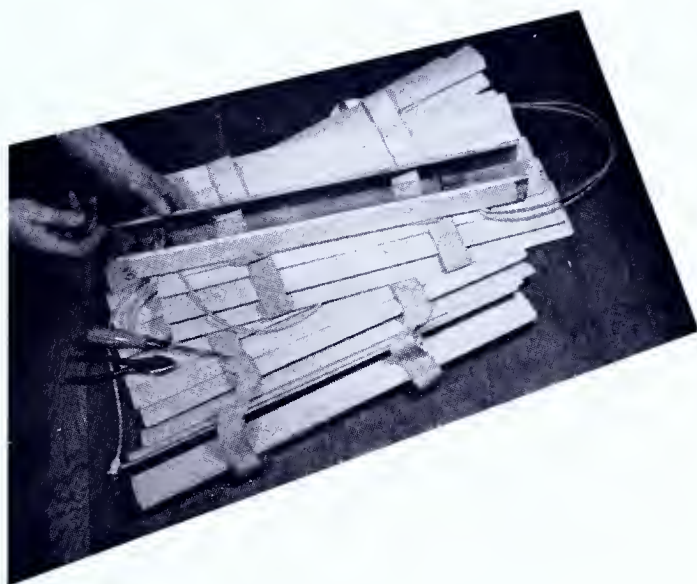
This bulletin does list, in the "The Things to Do and Things to Know" sections on pages 5 through 23, course content which may be selected by the teacher. These learning units also help to determine particular aims and objectives, amount of time available to pupils in the home mechanics area, and the necessary equipment.

Suggestions to guide the administrator are made on the organization of instruction, instructional material, tools and devices, possible projects, sample job assignments, and the use of records and forms, including samples of the information sheet and the operation sheet. Included for further guidance are a selected annotated bibliography of readily available instructional materials and visual aids, a suggested inventory of equipment and supplies, their approximate cost, feasible shop layouts, and other information related to establishing or enriching the home mechanics unit of a comprehensive general shop, or a unit (one activity) shop.

Matters pertaining to Industrial Arts in general are not discussed in this bulletin. For further information the reader is referred to Bulletin 331, *Industrial Arts in Pennsylvania*, published by the Department of Public Instruction, September, 1951.

1 *Home Mechanics*_____

AS A SCHOOL SUBJECT



The underlying philosophy in teaching Home Mechanics is in general identical with that of Industrial Arts education, particularly because it provides experiences in a variety of industrial materials and processes. It is an area which provides information and practical experiences in repair, maintenance, and construction work commonly performed in and about the home. Attention is given to instruction that enables boys, girls, and adults to contribute directly toward the maintenance and improvement of their homes. Such constructive work tends to develop confidence, self-reliance, and pride in accomplishment; it produces appreciations and understandings that have value in terms of family welfare and happiness. Home Mechanics is a part of Industrial Arts education in the same manner as community civics is a part of Social Studies instruction.

Home Mechanics is one of the many areas of Industrial Arts instruction which form an integral part of at least four activities in a comprehensive general Industrial Arts shop. It may also be taught as a unit (one activity) shop.

Objectives

If instruction is to be purposeful, aims and objectives must be established and developed. These objectives are formulated in terms of the goals desired. They provide a basis for the choice of subject matter and serve as a means for the evaluation of progress in the subject. The determination of objectives is, therefore, the starting point in the development of this area of instruction.

The Home Mechanics activity assists in the attainment of the broad general objectives of Industrial Arts Education as explained on pages 15 to 34 in *Industrial Arts in Pennsylvania*,¹ and provides experiences growing out of the following more specific objectives:

1. To develop understanding concerning the proper use and care of the house and household equipment; and to develop a pride in one's home
2. To maintain and improve the value of the residence by providing the training necessary to enable the pupil to perform jobs in connection with the upkeep and maintenance of the home—thereby saving time and money
3. To understand that home living today is conditioned by the many scientific advances in home building and household appliances
4. To develop a more intelligent purchaser and consumer of household goods and appliances
5. To develop elementary skills in the use of tools and materials in a variety of industrial areas
6. To develop an understanding and appreciation of a number of occupational fields of work
7. To develop interest in a home workshop

Organization and Grade Level

The instructional program outlined for Home Mechanics represents the maximum instructional requirements and can be offered on the junior and senior high school level. It is possible to offer the elementary phases in the junior high school grades, and more advanced work as a part of the senior high school program. Flexibility in this respect is possible because operations and jobs are independent of one another and need not be followed in fixed sequence. It is also possible to integrate and coordinate the work in Home Mechanics with the other areas of the comprehensive Industrial Arts shop.

¹ Bulletin 331, published by the Department of Public Instruction in September, 1951.

Because of the variety of experiences and the practical nature of the Home Mechanics activity, it is an excellent activity to offer in the ninth grade when the school receives an influx of pupils into this grade level who have not had previous Industrial Arts experience in grades 7 and 8. If Industrial Arts is not offered on the senior high school level, this is the only grade in which such pupils have contact with Industrial Arts work.

Instruction in Home Mechanics is designed for girls as well as boys. Homemaking classes provide instruction in the operation of various household appliances, but Home Mechanics aims to develop an understanding of the mechanics, technology, and proper maintenance of these appliances which results in more effective and intelligent utilization. In addition, the duties performed by the housewife are primarily of a service nature. Instruction in Home Mechanics is a service area rather than a productive type of activity and involves less danger than other activities, since it involves the use of hand tools rather than the operation of power equipment.

Areas of instruction have been selected with regard for the frequency of repairs commonly found in the average home. These jobs can and should be performed by the junior occupants of the household. Because most of the household jobs center around these activities, projects have been classified in the following fields: care of tools and equipment, woodwork and carpentry, upholstery, painting, decorating and wood finishing, electricity, metalworking, water supply and waste disposal, heating, cement and plaster work, and landscaping.

In order to fulfill the purposes of the course, it is recommended that double periods be provided rather than single periods.

Tools, Materials, and Processes

The Home Mechanics activity develops the philosophy of Industrial Arts education by providing experiences with many tools, operations, materials, and processes of industry. A wide variety of processes and materials should be used to meet the broad objectives of Industrial Arts and to provide the pupil with the media for desirable and needed experiences so that he can be better fitted into today's complex society.

Allied Occupations

The lack of clear-cut objectives of many high school pupils, plus the fact that the average graduate takes ten years and seven jobs to find his place in industry, indicates the importance of proper occupational guidance in the secondary school program. Acquiring a comprehensive view of occupational fields is an increasingly difficult task, since the

rapid change in problems of industry makes keeping pace with occupational changes more difficult. Young people, faced with the problem of choosing a vocation, naturally consider those fields of work with which they are most familiar. High school pupils have a narrow range of vocational choice resulting from the restricted number of occupations known to them.

An important function of Industrial Arts education is to provide exploratory experiences, vocational information, and understanding concerning occupational opportunities. The Home Mechanics activity is particularly adapted to carry out this vocational guidance objective since it provides experiences and information in such occupational fields as woodwork, carpentry, electricity, plumbing, masonry, painting, and decorating.

2 *Learning Units*_____

THINGS TO DO AND THINGS TO KNOW



The basis for the selection of subject matter for an Industrial Arts activity is an analysis of the processes of industry. The analysis provides a list of the manipulative or practical “doing” units as well as informational content. Final selection of subject matter is based on those experiences which are representative of and fundamental to the activity, and which contribute to the attainment of the objectives of the course. The final result is a list of learning units which represent the things a pupil should be able to *do* and the things he should *know*.

The following analysis of the Home Mechanics activity is based on the types of repair, maintenance, and improvement jobs commonly found around the home. The job units are classified under the following general divisions:

- A. Care of Tools and Equipment
- B. Woodwork and Carpentry
- C. Upholstery
- D. Painting, Decorating, Wood Finishing
- E. Electricity
- F. Metalworking
- G. Water Supply and Waste Disposal
- H. Heating
- I. Cement and Plaster Work
- J. Landscaping

UNIT A: CARE OF TOOLS AND EQUIPMENT

THINGS TO DO	THINGS TO KNOW
1. Remove rust from tools	a. Tool sharpening and maintenance
2. Clean and sharpen garden tools	(1) Importance of working with sharp tools
3. Sharpen a plane blade or wood chisel	(2) Preventing tools from rusting
4. Sharpen a knife	(3) When to grind a tool
5. Sharpen an ax or hatchet	(4) Use of the grinder
6. Sharpen a twist drill	(5) How to use the oil stone
7. Sharpen and adjust shears	(6) Use of the file
8. Sharpen tin snips	
9. Shape a screwdriver point	
10. Sharpen an auger bit	
11. Fit a hammer handle	
12. Clean, lubricate, and adjust a lawn mower	

UNIT B: WOODWORKING AND CARPENTRY

THINGS TO DO

1. Construct a hose rack
2. Reglue furniture
3. Lubricate door hinges
4. Install screen door spring
5. Tighten loose door hinges
6. Shim a door hinge
7. Install door bumpers
8. Hang a door with a surface hinge
9. Hang a door with a butt hinge
10. Adjust door knobs
11. Lubricate a cylinder lock
12. Thaw out a frozen lock
13. Install a lock
14. Install a hasp for a padlock
15. Repair a sticking door
16. Adjust strike plate

THINGS TO KNOW

- a. Lumber
 - (1) Grain
 - (2) Standard sizes and specifications of lumber
 - (3) Seasoning lumber
- b. Fastening devices for wood
 - (1) Kinds of nails
 - (2) Methods of nailing
 - (3) Corrugated fasteners
 - (4) Kinds of screws
 - (5) Methods of driving screws
- c. Gluing
 - (1) Kinds of glue
 - (2) Application of glue
 - (3) Clamping glued work
 - (4) Wedging hidden joints
- d. Doors
 - (1) Methods of construction
 - (2) Standard door sizes
 - (3) Thresholds
 - (4) Storm door
 - (5) Screen door
 - (6) Importance of proper painting of doors
 - (7) Types of door hinges
 - (8) Lubricating doors and windows
- e. Locks and catches
 - (1) Types of locks and catches
 - (2) Lock installation
- f. Door and lock repairs
 - (1) Analysis of common door ailments
 - (2) Causes of door latch failing to catch



THINGS TO DO

17. Replace broken sash cord
18. Adjust a window that sticks
19. Weatherstrip a window
20. Cut glass
21. Mix putty
22. Replace broken window pane (See page 29)
23. Caulk around door or window
24. Make a window screen
25. Make a storm sash
26. Reinforce window screen joints
27. Repair a window screen
28. Patch a hole in a window screen
29. Construct screen storage rack
30. Cut down width of a window shade
31. Hang a window shade
32. Hem a window shade
33. Adjust a window shade
34. Hang curtain rods
35. Panel a wall with plywood

THINGS TO KNOW

- g. Windows
 - (1) Types and styles of windows
 - (2) Causes of sticking windows
 - (3) Methods used in weatherstripping
 - (4) Glass
 - (5) Putty (See page 30)
 - (6) Replacing old putty
 - (7) Glazing metal sash
 - (8) Caulking
 - (9) Care and maintenance of steel windows
- h. Window Screens
 - (1) Types of screens
 - (2) Types of construction for screens
 - (3) Methods of patching screens
 - (4) Care of screens
 - (5) Methods of storing window screens and storm sash
- i. Window shades
 - (1) Types of window shade material
 - (2) Shade roller construction
 - (3) Window shade tension
- j. Wall paneling
 - (1) Paneling over old plaster
 - (2) Application of railing strip
 - (3) Nailing and gluing
 - (4) Horizontal joints and corners
 - (5) Finishing around doors and windows

THINGS TO DO

36. Panel with tongue and groove
37. Silence floor squeaks
38. Tighten stair treads
39. Repair roof shingles

THINGS TO KNOW

- (6) Application of finish to wall panels
- k. Causes and remedy of floor and stair squeaks
- l. Roof repairs
 - (1) Repairs to wood shingles
 - (2) Repairs to composition shingles

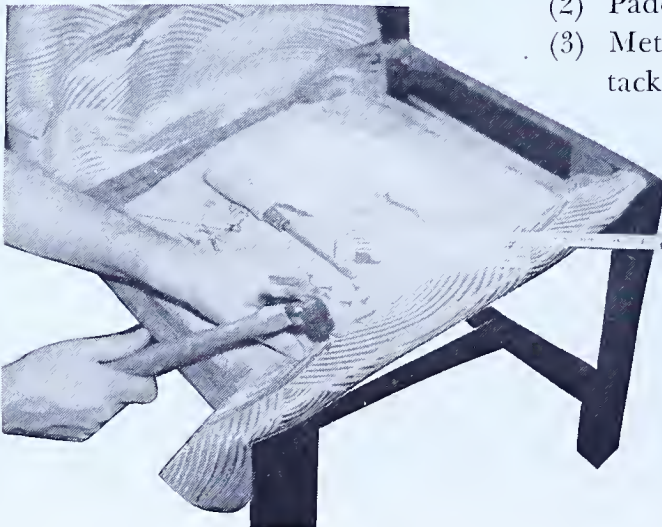
UNIT C: UPHOLSTERY

THINGS TO DO

1. Upholster a seat without springs
2. Recondition chair, springs, and padding
3. Upholster a chair
4. Remove spot from upholstery
5. Carpet a stairway

THINGS TO KNOW

- a. Upholstery materials
 - (1) Plastic coverings
 - (2) Foam rubber
 - (3) Tacking
- b. Reconditioning upholstered chairs
 - (1) Reset springs
 - (2) Retie springs
 - (3) Application of webbing and padding
- c. Procedure for applying upholstery material
- d. Carpeting
 - (1) Measuring and ordering carpet
 - (2) Padding steps
 - (3) Method of folding and tacking carpet



UNIT D: PAINTING, DECORATING, AND WOOD FINISHING

THINGS TO DO

1. Mix paint
2. Tint paint
3. Clean a paint, varnish, or shellac brush
4. Exterior house painting
5. Paint a sash
6. Paint exterior metal surfaces

THINGS TO KNOW

- a. Purpose of wood finishing
- b. Painting equipment
 - (1) Types and uses of brushes
 - (2) Use and care of ladders
 - (3) Wire brush
 - (4) Putty knife
 - (5) Sandpaper
- c. Method of storing paint
- d. How to mix paint
- e. How to tint paint
- f. Care and cleaning of brushes
 - (1) Care of brush while using
 - (2) Materials used for cleaning brushes
 - (3) Proper method of cleaning a brush
 - (4) Proper method of storing brushes
- g. Exterior painting
 - (1) Composition of exterior paints
 - (2) Number and types of coats for old and new work
 - (3) Method of application of paint
 - (4) Procedure for painting new work
 - (5) Procedure for painting old work
 - (6) Thinning exterior paint
 - (7) Estimating paint needs
 - (8) Don'ts for outside painting
 - (9) Paint troubles to avoid



THINGS TO DO

7. Paint a window screen
8. Apply enamel
9. Paint metal household furnishings and toys
10. Paint a plastered wall
11. Stencil a design on a painted surface

THINGS TO KNOW

- h. Painting metal surfaces
 - (1) Cleaning metal surfaces
 - (2) Metal priming
 - (3) Metal surface paints
 - (4) Painting window screens
- i. Enameling
 - (1) Composition of enamel
 - (2) Number and type of coats for old and new work
 - (3) Application of enamel
 - (4) Procedure for enameling new work
 - (5) Procedure for enameling old work
- j. Defects on outside painting
- k. Painting plastered walls
 - (1) Preparation of a new wall
 - (2) Preparation of an old wall
 - (3) Types of finishes

THINGS TO DO

12. Apply finish to new furniture
13. Refinish furniture
14. Repair damaged furniture finishes
15. Refinish old floors
16. Care for wood floor
17. Paint a concrete floor
18. Lay linoleum
19. Clean and refinish linoleum

THINGS TO KNOW

- l. Understand nature, type, use, and application of stains and fillers
- m. Use and application of various types of finishes
 - (1) Lacquer
 - (2) Varnish
 - (3) Shellac
 - (4) Natural
- n. Methods and procedure for removing old finish
- o. Methods of repairing damaged furniture finishes
 - (1) Scratches which have not damaged wood
 - (2) Scratches which have damaged wood
 - (3) Liquid stains
 - (4) Burns
- p. Method of refinishing old floors
- q. Types of floor finishes
- r. Care and maintenance of wood floor
 - (1) Cleaning hardwood floors
 - (2) Revarnishing a floor
- s. How to apply and care for linoleum
 - (1) Kinds of linoleum
 - (2) Preparation of floor surface for linoleum
 - (3) Procedure for laying linoleum
- t. Method of refinishing linoleum
Care of linoleum

THINGS TO DO

20. Prepare wall for papering

21. Hang wall paper

THINGS TO KNOW

u. Hanging wall paper

- (1) Tools needed
- (2) Removing old wall paper
- (3) Cleaning walls
- (4) Calculating paper requirements
- (5) Mixing wall paper paste
- (6) Application of paste to paper
- (7) Matching the pattern
- (8) Applying border



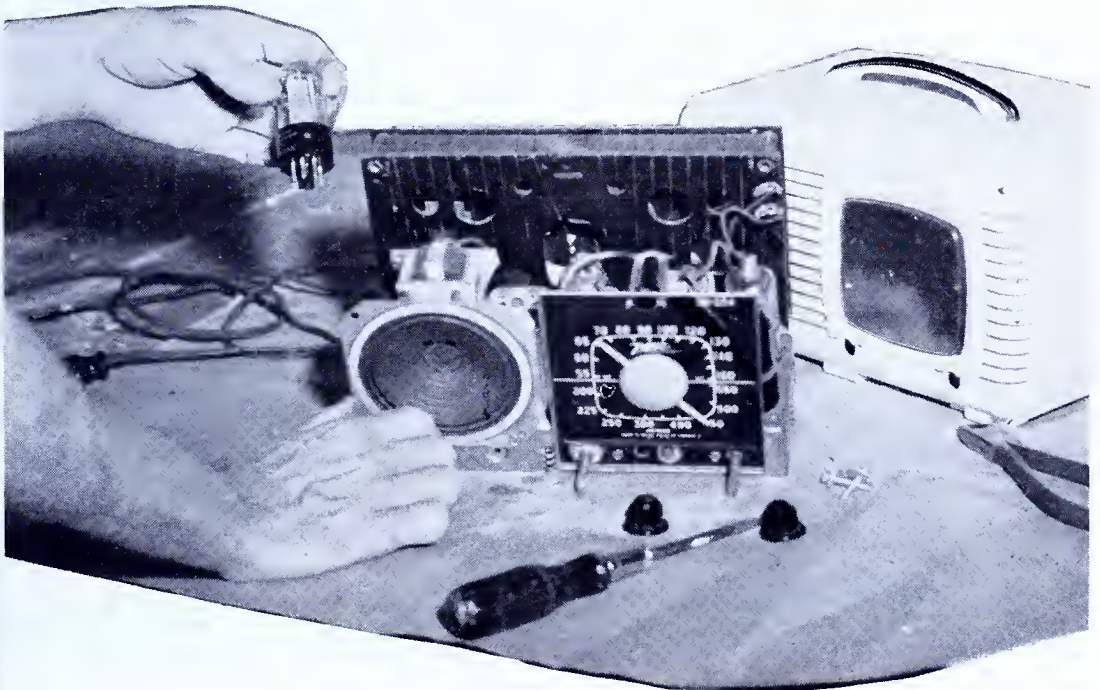
UNIT E: ELECTRICITY

THINGS TO DO

1. Make a pigtail splice
2. Solder an electrical splice
3. Make a Western Union splice
4. Make a branch top splice
5. Splice an appliance cord
6. Replace a lamp socket
7. Replace a male plug
8. Install a feed-through switch

THINGS TO KNOW

- a. Basic Electricity
 - (1) AC and DC current
 - (2) Identification of AC and DC appliances
 - (3) Voltage
 - (4) Safety precautions
 - (5) Size of wire
 - (6) Kinds of wire
 - (7) Home wiring
- b. Wire splicing
 - (1) Preparation of wire
 - (2) Soldering splices
 - (3) Taping splices
- c. Repair of electrical cords
 - (1) Staggered splices
 - (2) Underwriters' knot
 - (3) Separating a socket
 - (4) Types of sockets
 - (5) Types of plugs



THINGS TO DO

9. Install bell circuit to operate two bells with one button
10. Install bell circuit to operate two bells from two buttons
11. Determine the load on an electric circuit
12. Replace fuse
13. Make a fuse box chart
14. Use wiremold—one light controlled by a single pole switch
15. Use Romex—switch (opening 1) to control a light (opening 3) and receptacle in center and hot at all times
16. Use BX—light (opening 1) controlled by switch (opening 3) with receptacle in middle
17. Use Conduit—light controlled by two 3-point (3-way) switches
18. Replace a wall switch or wall outlet
19. Install a wall outlet
20. Replace or install a light fixture
21. Read an electric meter

THINGS TO KNOW

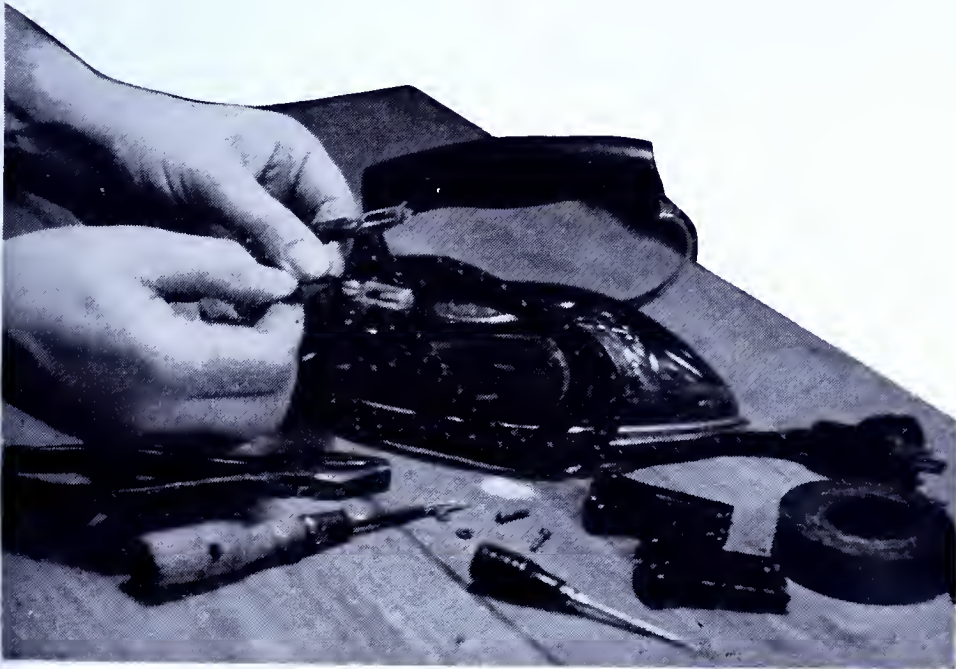
- d. Bell wiring
 - (1) Principle of doorbell circuits
 - (2) Method of installing bell wire
 - (3) Use of the transformer
 - (4) Trouble-shooting in a doorbell circuit
- e. House wiring
 - (1) Electric circuits
 - (2) Overload and short circuits
 - (3) Types and purpose of fuses
 - (4) Procedure for replacing fuses
 - (5) Use of wiremold
 - (6) Use of Romex and conduit
 - (7) Use of conduit
 - (8) Types of junction boxes and switches
 - (9) Procedure for replacing switches
 - (10) Wall outlets
 - (11) Home lighting
 - (12) Types of lighting fixtures
 - (13) Fluorescent lighting
- f. Measuring and paying for electricity
 - (1) The electric meter
 - (2) Calculating cost of electric current

THINGS TO DO

22. Replace element in iron or toaster
23. Clean and oil a motor
24. Repair a broken belt
25. Maintain and repair appliances
26. Clean a radio
27. Replace a radio dial string
28. Replace a radio tube
29. Clean and reset clearance on spark plug

THINGS TO KNOW

- g. Electric heating appliances
 - (1) Principle of heating appliances
 - (2) Care of heating appliances
 - (3) Repair of heating appliances
- h. Motor maintenance
 - (1) Proper use of a motor
 - (2) Method and frequency of oiling a motor
 - (3) Cleaning a motor
- i. The vacuum cleaner
 - (1) Types of vacuum cleaners
 - (2) Common adjustments and repairs
- j. Radio
Precautions in making radio repairs



UNIT F: METALWORKING

THINGS TO DO

1. Solder
2. Construct closet rod-holder
3. Construct mending plates
4. Tin a soldering copper
5. Patch a hole in sheet metal
6. Solder an electrical splice
7. Solder a leaky seam
8. Fasten wire
9. Construct a screen door hook
10. Replace rain spout elbow
11. Install splash guards on spouting

THINGS TO KNOW

- a. Facts concerning the common metals
 - (1) Galvanized sheet iron
 - (2) Cast iron
 - (3) Stainless steel
 - (4) Copper
 - (5) Silver
- b. Tools and materials used in soldering
- c. Soldering old work
 - (1) Patching holes
 - (2) Repairing seams
- d. Methods of fastening wire



UNIT G: WATER SUPPLY AND WASTE DISPOSAL

THINGS TO DO

1. Assemble threaded pipe fittings
2. Assemble copper pipe fittings
3. Make temporary repair to leaking pipe

THINGS TO KNOW

- a. General arrangement of the house plumbing system
- b. Care of porcelain plumbing fixtures
- c. Identification of types of pipe fittings
- d. Pipe fitting



4. Repair leaking garden hose
 5. Replace faucet washer
 6. Repack a compression faucet or valve
 7. Clean a shower head
 8. Silence noisy pipes
 9. Thaw out a frozen water pipe
- e. Care and repair of the garden hose
 - (1) Types of hose fittings
 - (2) Proper storage of the garden hose
 - f. Types of faucets and valves
 - g. Methods used to thaw out frozen pipes
 - h. Draining a plumbing system

THINGS TO DO

10. Repair flush tools
11. Clean a clogged drain trap or sewer line

THINGS TO KNOW

- i. Common flush tank difficulties
 - Flush tank adjustments
- j. Waste disposal systems
- k. The septic tank
- l. Care of drains
- m. Methods of cleaning traps and sewer lines
 - (1) Use of solvents
 - (2) Use of the plunger
 - (3) Use of the plumber's snake

UNIT H: HEATING

THINGS TO DO

1. Clean out a hot water tank
2. Plug a leak in hot water tank
3. Insulate water pipe
4. Maintain a furnace
 - a. Clean heater unit
 - b. Clean and check smoke pipe
 - c. Seal chimney joints
 - d. Check clean-out door
 - e. Check insulated furnace joints
 - f. Remove boiler sediment
 - g. Check automatic valves
5. Clean and adjust stoker and air units

THINGS TO KNOW

- a. Types of home heating plants
- b. Methods of repairing leak in hot water tank
 - (1) Use of toggle bolt
 - (2) Use of tapered plug
- c. Pipe insulation
 - (1) Purpose of insulating pipes
 - (2) Types of pipe coverings
 - (3) Insulating joints and connections
- d. Firing hand-fed furnaces

THINGS TO DO

- a. Clean limits
 - b. Check belts
 - c. Check oil level
 - d. Oil
 - e. Check screw feed and shear pin
6. Clean strainers and nozzle on oil burner
 7. Clean and adjust a gas stove
8. Read a gas meter
 9. Read a water meter

THINGS TO KNOW

- e. Fireplace use and care
- f. Method of lighting an oil burner
- g. Care and maintenance of a gas stove
 - (1) Understand operation of a gas stove
 - (2) Identify a properly adjusted flame
 - (3) Cleaning the gas burner
 - (4) Adjusting a gas burner
 - (5) Locating gas leaks
- h. Procedure for lighting a gas furnace or water heater
- i. Method of computing cost of gas and water

UNIT I: CEMENT AND PLASTER WORK

THINGS TO DO

1. Patch a plaster crack
2. Patch a plaster hole
3. Set tile
4. Waterproof a basement wall

THINGS TO KNOW

- a. Plaster
 - (1) Composition of plaster
 - (2) Patching plaster
- b. Tile
 - (1) Kinds of tile
 - (2) Methods of installation of tile
- c. Waterproofing
 - (1) Types of seepage holes
 - (2) Types of waterproofing
 - (3) Application of waterproofing

THINGS TO DO

5. Repair concrete sidewalk
6. Make stepping stones
7. Repoint a brick or stone wall
8. Repair chimney
9. Build a brick terrace
10. Build an outside fireplace

THINGS TO KNOW

- d. Concrete work
 - (1) Types of concrete mixes
 - (2) Ready-mixed concrete
 - (3) How to mix concrete
 - (4) Curing concrete
 - (5) Reinforced concrete
 - (6) Concrete forms
 - (7) Finishing poured concrete
- e. Brick work
 - (1) Composition of mortar
 - (2) Laying brick
 - (3) Finishing joints
 - (4) Forming chimney cap
- f. Brick walks and terraces
 - (1) Preparation of footing
 - (2) Procedure for laying brick



UNIT J: LANDSCAPING

THINGS TO DO

1. Draw a landscaping plan for the home
2. Construct a walk or driveway
3. Care for the lawn
4. Construct a wall, fence, or gateway
5. Select and order plants
6. Plant trees or shrubs
7. Prune trees
8. Prune shrubs

THINGS TO KNOW

- a. Importance of attractive home surroundings
- b. Principles of landscape design
- c. Planning and drawing the landscape plan
 - (1) Walks and drives
 - (2) Grading
 - (3) Trees and shrubs
 - (4) Flowers
 - (5) The garden
- d. Lawn care
 - (1) Soil preparation
 - (2) Seeding
 - (3) Feeding a lawn
 - (4) Lawn mowing
 - (5) Sodding
- e. Walls, fences, and gateways
- f. How to select and order plants
 - (1) Number of plants desired
 - (2) Latin or trade name
 - (3) Size, grade, or age
 - (4) Shipping instructions
 - (5) Date receipt of goods is desired
- g. How to plant trees and shrubs
 - (1) Planting seasons
 - (2) How to plant trees
 - (3) How to plant shrubs
 - (4) Planting roses or bulbs
- h. How and when to prune trees
- i. How and when to prune shrubs

3 Organization of Instruction, Instructional Material, and Devices

SIGNIFICANT PROJECTS AND ACTIVITIES



The Home Mechanics area of instruction appeals to many because of its practical nature. It is training in those experiences which face all adults in the maintenance of a home.

Project selection in most of the Industrial Arts areas is based on the operations involved. Practical learning operations and informational units are determined and arranged so that they progress from the simple to the complex. Projects are then selected to incorporate the operations to be taught. Shop projects are the objects around which the instructional plan is built; it is the medium which teaches what a boy or girl should know.

Practical learning units or projects in Home Mechanics, however, are not selected or based on a predetermined list of operations. Areas of instruction are based on an analysis of the frequency of types of repair, maintenance, and construction work commonly performed in and about the average home. Jobs and activities are, therefore, based on this analysis and as a result the number of take-home projects is limited. Moreover, since it is difficult to list jobs in Home Mechanics so that they progress from the simple to the complex, most jobs are independent of one another and need not be taught in any particular order. All practical work should be assigned so that each progressive job provides the learning of new processes and the use of tools which contribute to the attainment of the general objectives of the course. Emphasis in this activity is on *instruction* rather than *construction*, with attention centered on the development of an understanding of method and procedure in the performance of jobs.

Use of Records, Forms, and Charts

The Industrial Arts teacher of a comprehensive shop program is confronted with many problems pertaining to the administration of the program, details of instruction, and the handling of supplies. The problems increase as the activities in the shop become more diversified. Development of adequate record-keeping forms and charts, and the maintenance of accurate up-to-date records are an important responsibility of the Industrial Arts teacher. If properly developed, record-keeping will not be time-consuming and monotonous, but will aid the teacher in showing daily teacher-pupil progress. Such records should also prove useful in the evaluation, development, and improvement of the instructional program. Care should be taken, however, that the teacher does not become so involved with record-keeping that he becomes a mere clerk. Instead, a plan can be devised whereby pupils and teacher share the work of recording pupil progress in the learning units.

PROGRESS CHART. The use of a Pupil Progress Chart is of particular importance in the operation of the Home Mechanics activity. Since the activities taught are established through an analysis of jobs common to household repair and maintenance, and since these jobs are unrelated and need not be taught in a particular order, it is essential that an accurate record of each pupil's accomplishment be maintained on a progress record. A suggested progress chart is shown on page 27.

PUPIL CUMULATIVE PROJECT RECORD. While projects are not considered as ends in themselves but rather as means to an end, the nature

PROGRESS CHART

Course _____										
Grade _____	Semester _____					Year _____				
Section _____										
Days _____										
Periods _____										
	Information Units					JOBS				
Pupils' Names										

and number of projects completed by the pupil are some indication of the extent to which the objectives of the course are being met. The use of this record is particularly important in the comprehensive general shop where the activities are highly diversified. A suggestive example of the Cumulative Record Form is shown on page 28.

Instructional Materials

When shop work was first introduced into the public schools, teachers felt that it provided a means of escape from the "drudgery" of books. Because of this fact, very little use was made of written instructional materials in the teaching of Industrial Arts. In recent years, however, since interest in the comprehensive general shop has increased, instructors are aware that the multi-activity shop can be taught most effectively through the use of instruction sheets. Written instruction sheets are of great value in giving specific directions quickly to the pupil or to a group who have different backgrounds, interests, and abilities.

INSTRUCTION SHEETS. Instruction sheets are particularly helpful in giving individual instruction where pupils progress independently at their own speed.

Industrial Arts Department

School

City

[illegible]

1. The teacher has more time to select instructional material and to arrange it in the best learning order.
2. More accurate instructions are possible.
3. The responsibility to seek out information is placed on the student.
4. Accurate record keeping and checking can be carried on easily.
5. Larger classes can be handled more effectively.
6. The teacher has more time for helping individual pupils.

It is important to get pupils started in the right manner. The objectives, methods, procedures, and teaching devices must be planned and explained so as to emphasize that the shop is a place to *learn things* as well as *make things*. Teaching does not consist primarily of telling and showing but rather in providing shop experiences which interest the pupils and create the desire to learn.

The practical and informational learning units in Home Mechanics are comprehensive, providing experiences in all areas ranging from

the simple to the complex. Considerable flexibility exists in content. The course can be taught in its entirety or, if a less comprehensive program is desired, the analysis provides a basis for selection of units of instruction most applicable to the needs and interests of the group, or the individual pupil.

Success in teaching Home Mechanics as an Industrial Arts activity depends largely on proper planning of instruction and the development of instructional materials, such as information sheets (see sample, page 30) and job sheets (see sample below). The development of instruction sheets is essential because of the variety of types of shop activities which must be taught on an individual instruction basis.

In addition, instruction sheets are essential as work sheets in the school shop in preparation for doing the job at home for school credit. Pupils should be encouraged to bring typical repair jobs from home to the shop.

Home Mechanics instruction is primarily individual instruction carried through several grades; therefore, it is important that accurate progress records be kept for each pupil.

SAMPLE JOB SHEET

..... HIGH SCHOOL
..... SCHOOL DISTRICT
UNIT B: Woodwork and Carpentry
JOB SHEET No. 22 (See page 9)
JOB: Replace Broken Window Pane

REFERENCES:

- 1. *Better Homes and Gardens Handyman's Book*, page 285.
- 2. *Household Mechanics*, Bedell and Gardner, page 173.

TOOLS AND MATERIALS: 1" wood chisel, putty knife, paint brush, glazier points, putty, pane of glass.

SAFETY PRECAUTIONS:

If the glass is shattered, wear gloves and remove the broken glass carefully. Pliers may also be used to remove broken glass.

PROCEDURE:

- 1. Remove broken glass, if pane is broken.
- 2. Remove old putty.
- 3. Apply thin paint or linseed oil to the rebate of the sash.
- 4. Spread a thin layer of putty in the rebate of the sash.
- 5. Place glass in the sash and press into place.
- 6. Drive glazier points.
- 7. Mix putty.
- 8. Apply putty to the sash and smooth to a straight bevel.
- 9. Clean the glass.

SAMPLE INFORMATION SHEET

..... HIGH SCHOOL

..... SCHOOL DISTRICT

UNIT B: Woodwork and Carpentry

INFORMATION SHEET No. g (5) See page 9.

SUBJECT: Use of Putty

REFERENCES:

1. *Better Homes and Gardens Handyman's Book*, page 285.
2. *Household Mechanics*, Bedell and Gardner, page 173.

INFORMATION:

Putty is made from pulverized chalk called *whiting*, mixed with linseed oil. White lead is sometimes added to make the putty more durable. Putty hardens in two to six weeks, depending on the condition of the window sash, the weather, and the amount of oil used in the putty. The *rebate* (or groove) of the sash should always be given a thin coat of paint before putty is applied to prevent the dry wood from absorbing the oil from the putty.

Newer types of *glazing compounds* are more elastic than the old type, and do not chip, powder, or dry out as rapidly. They are easier to apply and can be used on wood or steel sash. Putty is purchased in one-pound or five-pound cans. When not in use, putty in partially filled cans should be covered with water to keep the putty soft.

Putty should be thoroughly mixed before being applied by kneading the putty with the hands and adding oil or whiting until it works easily and does not stick to the fingers. Putty can be colored by adding thick pigment from the bottom of a paint can, during the kneading process.

If putty is extremely hard and difficult to remove, run a hot soldering iron slowly along the putty ahead of a chisel. The heat will soften the putty and it can then be removed more easily.

Putty can best be applied to a sash by rolling it into pencil-size strips. Starting at a corner, lay strips end to end around the glass.

Common reasons for putty's cracking and falling out are:

1. Poor quality of putty.
2. Rotten sash.
3. Failure to paint the wood sash before applying putty. When unpainted, the wood absorbs the oil from the putty, causing it to crumble and fall out.
4. Water gets into cracks and lifts out the putty.

QUESTIONS:

1. How do you knead putty?
2. How can hard putty be softened?
3. What is the proper way to store leftover putty?

SAMPLE PUPIL JOB PLAN

..... HIGH SCHOOL

..... SCHOOL DISTRICT

Name..... Grade..... Section.....

Project..... Teacher Approval..... Date.....

SKETCH: Make a working sketch of the job or project to be made.

PROCEDURE: List the principal steps in doing the job, showing what you will do first, second, third, etc.

1.
2.
3.
4.
5.
6.
7.
8.
9.

BILL OF MATERIAL:

<i>No. of Pieces</i>	<i>Kind of Material</i>	<i>Name of Part</i>	<i>Thick- ness</i>	<i>Width</i>	<i>Length</i>	<i>Unit Price</i>	<i>Cost</i>

Shop Management Organization

As the activities presented in Industrial Arts shops are increased in number and scope, it is expedient for the teacher to assign some of the routine duties to pupils. The purpose and the plan itself will not be the same for all schools, depending on the activities offered, size of class, age of students, length of periods, and physical layout of the shop. This cooperative plan is an effective device for achieving the following common Industrial Arts objectives:

1. To present practice in leadership and "followership."
2. To motivate the pupils' understanding of industrial operations and applications.
3. To develop responsibility and a feeling of belonging to the activity.
4. To aid the teacher in many routine duties.

The shop management activities should be planned and organized by the class. A teacher-imposed plan is readily recognized by the pupils, and has a tendency to destroy pupil interest. Better cooperation can be developed therefore through a personnel plan developed by the pupils with teacher guidance and direction. Pupils may assist in the development of the plan as a class or through a committee of pupils from several classes. A plan developed in this manner motivates the pupils' interest in industrial personnel organization and provides an incentive for the study of local plant personnel systems. The extra time spent in the democratic development of this plan is more than

compensated by the added cooperation attained by the teacher, and the guidance value received by the pupils.¹

In order to make a pupil shop management plan operate successfully, the importance, need, and practicability must be explained carefully to the pupils. The success of the program depends entirely upon the pupils' acceptance; therefore, the teacher should plan his presentation carefully in order to justify the value and need of such a program.

A check list for periodic evaluation of the condition of the shop appears below, which may be used by the pupil foreman in evaluating and checking the work of the clean-up personnel.

PARTIAL CHECK LIST ON CARE OF THE SHOP

TEACHER		Yes	No
1. A place for everything and everything in its place
2. Benches and machines well arranged
3. Tools and equipment in good repair
4. Bulletin board material well arranged and changed frequently
5. Teacher's desk orderly
6. A container for oil rags
7. Machines oiled regularly
8. Other
9. Other
FOREMAN			
1. Machines cleaned properly
2. Storage room well kept
3. Tools clean, in racks, and all accounted for
4. Blackboard clean
5. Finishing room clean and orderly
6. Floor cleaned daily
7. Books, pamphlets, blueprints—clean and well arranged
8. Lockers kept properly
9. Projects stored in good order
10. Sink clean
11. Clean-up tools in proper place
12. Other
13. Other

¹ Suggestions for the development of a student personnel organization plan is given in *Industrial Arts in Pennsylvania*, Bulletin 331, 1951, page 83.

4 *Instructional Aids*_____

BOOKS, MAGAZINES, FILMS



In a book of this kind it is impossible to list all of the instructional materials in the form of books, pamphlets, study guides, charts, etc. Many instructors may be using excellent instructional aids not included here. This listing is not exhaustive.

Certain instructional materials are listed, however, with author, publisher, address of publisher, and an annotation of the contents, so that the Industrial Arts teacher will know what phase of instruction is included in each reference.

Books

Ashcroft, C. C., and Easton, J. A. G., *General Shop Work*. Toronto, Canada, The Macmillan Company of Canada Limited, 1940, 239 pp.

A well-illustrated instruction manual covering processes and operations involved in drafting, hand woodwork, machine woodwork, sheet metal work, art metal, bench and machine metal work, forge work, pipe fitting, concrete work, leather work, rope work, motor mechanics, automotive electricity, and applied general electricity.

Bedell, Earl L. and Gardner, Ernest G., *Household Mechanics*. Scranton, Pennsylvania, International Textbook Co., 1950, 241 pp., \$2.75.

Detailed instructions for the performance of every type of home repair. Each job is introduced with brief general information concerning the job, material needed, equipment needed, suggested procedure for doing the job, including special

notes and cautions, and several questions to use as a check in evaluating the success of the job. Preceding each chapter and job is a brief description of the essential related and general information necessary for better performance and understanding. The text has 642 photographs and sketches. Jobs are classified in the following areas: woodworking, metalworking, painting and finishing, care of electric appliances, water supply and waste disposal, care of doors, care of windows, use of concrete, mortar and plaster; use of rope and twine, and the home workshop.

Better Homes and Gardens Handyman's Book. Des Moines, Iowa, Meredith Publishing Company, 1951, 480 pp., \$3.95.

This book is designed entirely to provide basic know-how, clearly and simply, for the person who is interested in keeping his house in good order. Each step in the job procedure is described as well as illustrated by a photograph or sketch. Jobs are classified in fourteen chapters including those pertaining to: hand tools, fastening techniques, finishing techniques, heating plants and fireplaces, plumbing repairs, electrical repairs, walls, storage, windows and doors, floors, exterior repairs and yardwork, furniture and accessories, power tools, and lumber.

Cobb, Hubbard, *Amateur Builder's Handbook.* New York, William H. Wise & Co., Inc., 1951, 512 pp., \$3.00.

Gives detailed instructions on every phase of home repair, improvement, and beautification. It gives tips, tricks, and short cuts in easy-to-follow explanations on how each job is done. Areas covered include concrete, masonry, blocks, brick, glass, rough carpentry, millwork, flooring, windows, doors, closets, roofing, flashing, insulation, ventilation, electrical systems and lighting, plumbing, heating, fireplaces and chimneys, interior wall materials and finishes, paints, painting, finishes, tools, nails, screws and hardware.

Dragoo, A. E., and Dragoo, K. L., *General Shop Electricity.* Bloomington, Illinois, McKnight and McKnight Publishing Company, 1935, 75 pp., \$.60.

A manual covering such general shop electricity as wiring frames and panels, equipment, simple wiring circuits, battery connections, high and low voltage house lighting, practical application of basic information about high voltage current, and occupational study. Well illustrated.

Ericson, E. C., and Soules, R. L., *Planning Your Home.* Peoria, Illinois, Manual Arts Press, 1938, 131 pp., \$2.00.

Fundamental considerations in home planning with suggested work units. Covers materials, styles of architecture, and details of planning. An excellent book for courses in home planning.

Newell, Adah C., *Coloring, Finishing and Painting Wood.* Peoria, Illinois, Chas. A. Bennett Co., Inc., 480 pp., \$6.00.

An up-to-date coverage of varnishes, stains, paints, abrasives, other wood and metal finishing materials, and their uses. Contents include preparation of the surface of wood—by the use of surface abrasives, water stains, oil stains, and spirit stains; application of such stains as chemical stains; colors and wood stains, dyes useful as stains; and explains how to use wood fillers, spirit varnishes, enamels, oil varnishes, lacquers, paints, synthetic resins, quick-drying varnish, blond and bleached wood finishes, and air-drying finishes for metal.

Pope, Blanche Romick, *Upholstering Home Furniture*. Peoria 3, Illinois, Chas. A. Bennett Co., Inc., 1949, 320 pp., \$4.00.

All processes are shown for producing new furniture from scrap material and rebuilding and reupholstering old furniture, including the conversion of rockers and side chairs into upholstered pieces. Slip-covering details are also included. Covers such specific subjects as: What you can do in upholstery, box furniture construction, edge rolls and pads, springs and spring work, occasional chair construction and upholstery, cushions, reconditioning and reupholstering, simple basic furniture plan and variations, slip covers and protectors, color in the home, draperies, arrangement of furniture. Illustrated.

Seager, C. W., *Upholstered Furniture*. Milwaukee, Wisconsin, Bruce Publishing Company, 1936, 181 pp., \$2.00.

A comprehensive treatment of processes, tools, and materials for upholstery. Each process is carefully illustrated with pictures and drawings. Gives detailed directions for upholstering eight pieces of furniture ranging from a footstool to a davenport.

Woodin, J. C., *Home Mechanics*. Bloomington, Illinois, McKnight and McKnight Publishing Company, 1949, 104 pp., \$1.25.

The book is made up of 29 units of instruction covering only the most common types of jobs found in the field of household repair. Each unit contains objectives, description of related and technical information necessary to perform the job, step-by-step procedure for performance of the various operations involved in doing the job, and a list of suggested activities for carrying out the unit of instruction.

Magazines

Better Homes and Gardens. The Meredith Publishing Company, 1714 Locust St., Meredith Building, Des Moines 3, Iowa. Monthly. \$3.00.

Popular Mechanics. Popular Mechanics Publishing Co., 200 East Ontario Street, Chicago 11, Ill. Monthly. \$3.00.

Popular Science. Popular Science Publishing Co., 353 Fourth Avenue, New York 10, N. Y. Monthly. \$3.00.

The Home Craftsman. The Home Craftsman Publishers, 115 Worth Street, New York 13, N. Y. Monthly. \$2.00.

Bulletins, Charts, and Posters

ABC'S of Hand Tools. General Motors Corporation, Detroit 2, Mich.

A Course in the Elements of Modern Surface Raceway Wiring. Wiremold Company, Hartford 10, Conn.

Alternating Current Simply Explained. Wagner Electric Corporation, 6400 Plymouth Avenue, St. Louis 14, Mo.

Beautiful Interiors. Douglas Fir Plywood Association, Tacoma Building, Tacoma, Wash.

Brief on Gypsum Plaster. Gypsum Association, 330 South Wells Street, Chicago 6, Ill.

- Casco Gluing Guide.* Casein Corporation of America, 350 Madison Avenue, New York, N. Y.
- Concrete Facts for Concrete Contractors.* Portland Cement Association, 33 West Grand Avenue, Chicago, Ill.
- Corrosion in Soldering.* Kester Solder Company, 4201 Wrightwood Avenue, Chicago, Ill.
- Do's and Don'ts for Gluing.* LePage's, Inc., Gloucester, Mass.
- Facts on Soldering.* Kester Solder Company, 4201 Wrightwood Avenue, Chicago, Ill.
- Files—How to Select, Use and Conserve Them.* Delta File Works, Inc., Philadelphia, Pa.
- Handbook and Catalog of Publications and Materials for Classroom and Industrial Arts Teacher.* Industrial Arts Cooperative Service, 519 West 121st Street, New York, N. Y.
- Handbook of Residential Wiring Design.* Illuminating Engineering Society, 51 Madison Avenue, New York 10, N. Y.
- Hints on Files and Filing.* Nicholson File Company, Providence, R. I.
- Home, (a booklet on home wiring).* General Electric Consumers Institute, 1285 Boston Avenue, Bridgeport, Conn.
- Home Lighting, Recommended Practice.* Illuminating Engineering Society, 51 Madison Avenue, New York 10, N. Y.
- How's and Whys as Applied to Floors, Furniture, and Woodwork.* S. C. Johnson & Son, Inc., Racine, Wis.
- How to Choose and Use an Electric Cleaner.* The Hoover Company, North Canton, Ohio.
- How to Heat Your Home.* Anthracite Institute, 19 Rector Street, New York, N. Y.
- How to Identify Genuine Mahogany.* Mahogany Association, Inc., 75 East Wacker Drive, Chicago 1, Ill.
- How to Lay, Finish and Care for Mofma Oak Floors.* National Oak Flooring Association, 830 Dermon Building, Memphis, Tenn.
- How to Protect Your Home Against Rust.* American Brass Company, Waterbury 88, Conn.
- How to Repair and Refinish Furniture.* The Savogram Company, India Wharf, Boston 10, Mass.
- How to Sharpen.* Behr-Manning Corporation, Troy, N. Y.
- How to Take Care of Your Rugs and Carpets.* Bigelow-Sanford Carpet Company, Inc., 140 Madison Avenue, New York, N. Y.
- How to Use Flux Fill Solder.* Kester Solder Company, 4201 Wrightwood Avenue, Chicago, Ill.
- Improving Lawns with Anthracite Ash.* Anthracite Institute, 19 Rector Street, New York, N. Y.
- Instructions for Installing Modern Plumbing Systems.* Sears, Roebuck & Company, Philadelphia, Pa.
- Lessons in Practical Home Illumination, (An Outline).* Illuminating Engineering Society, 51 Madison Avenue, New York 10, N. Y.

- Painting Exterior Plywood.* Douglas Fir Plywood Association, Tacoma Building, Tacoma, Wash.
- Paneling Suggestions.* Douglas Fir Plywood Association, Tacoma Building, Tacoma, Wash.
- Pipe Threading Principles.* Bulletin No. 6, National Tube Company, Pittsburgh, Pa.
- Pittsburgh Color Dynamics for the Home.* Pittsburgh Plate Glass Company, 632 Duquesne Way, Pittsburgh 22, Pa.
- Planning Better Plumbing for Your Home.* American Radiator Corporation, Box 1226, Pittsburgh, Pa.
- Practical Finishing Methods.* Delta Manufacturing Company, Milwaukee, Wis.
- Rosin-Filled Solders.* Kester Solder Company, 4201 Wrightwood Avenue, Chicago, Ill.
- Rumpus Room.* Douglas Fir Plywood Association, Tacoma Building, Tacoma, Wash.
- Sidelights on Stains.* National Paint, Varnish and Lacquer Association, Inc., 1500 Rhode Island Avenue, N. W., Washington 5, D. C.
- Soldering Tips.* Kester Solder Company, 4201 Wrightwood Avenue, Chicago, Ill.
- Some Facts About Wax.* S. C. Johnson & Son, Inc., Racine, Wis.
- Steel Electric Raceways.* American Iron and Steel Institute, 350 Fifth Avenue, New York 1, N. Y.
- Teacher's Handbook on Care of Floors, Furniture, and Woodwork,* S. C. Johnson & Son, Inc., Racine, Wis.
- The ABC of Plastering.* Gypsum Association, 330 S. Wells Street, Chicago 6, Ill.
- The Fascinating Story of Pigments.* National Paint, Varnish, and Lacquer Association, Inc., 1500 Rhode Island Avenue, N. W., Washington 5, D. C.
- The New Way to Wire a House.* National Electric Products Corporation, Pittsburgh, Pa.
- The Paint Story.* National Paint, Varnish, and Lacquer Association, Inc., 1500 Rhode Island Avenue, N. W., Washington 5, D. C.
- The Romance of Shellac.* National Paint, Varnish, and Lacquer Association, Inc., 1500 Rhode Island Avenue, N. W., Washington 5, D. C.
- The Story of Linoleum.* Armstrong Cork Company, Lancaster, Pa.
- The Use of Oilstones.* Project 5, Behr-Manning Corporation, Troy, N. Y.
- Wiremold Surface Metal Raceway Wiring Systems.* Wiremold Company, Hartford 10, Conn.
- Work Sheets on Refinishing.* General Finishes Sales and Service Company, 1548 West Bruce Street, Milwaukee, Wis.

U. S. Government Bulletins

The following can be ordered from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.:

- Care and Repair of the House*, BH 15, 15¢
- Care of Damaged Shade Trees*, A1-9:1896, 10¢
- Care of Ornamental Trees and Shrubs*, A1-9:1826, 10¢

Concrete Floor Treatments, TIMB-9
Finishes and Maintenance of Portland Cement Stucco Construction, TIMB-21
Home Insulation, Its Economies and Application, 10¢
Outside House Painting, LC-603
Paints: Oil, Interior, TT-P-51a, 5¢
Paints: Outside, Ready-Mixed, TT-P-53, 5¢
Plumbing Manual, BMS-66, 20¢
Preventing Cracks in New Wood Floors, Leaflet 56, 5¢
Recommended Minimum Requirements for Plumbing, BH-13, 50¢
Shellac, TIBM-48
Simple Plumbing Repairs Bulletin, 5¢
Sound Insulation of Wall and Floor Construction, BMS-17, 10¢
The Gluing of Wood, 1500-A1-3:1500, 25¢
Tree Preservation Bulletin No. 4, Shade Tree Pruning, 10¢
Tree Preservation Bulletin No. 6, General Spraying Practices, 10¢
Tree Preservation Bulletin No. 9, Transplanting Trees and Other Woody Plants, 10¢
Varnish and Lacquer, TIBM-47

Film Sources

Audio-Visual Aid Catalog, Bulletin 208, Commonwealth of Pennsylvania, Department of Public Instruction, Harrisburg, Pa.
Slidefilms and Motion Pictures to Help Instructors, The Jam Handy Organization, Educational Film Department, 2900 East Grand Boulevard, Detroit 11, Mich.
Sound Motion Pictures and Slidefilms, Westinghouse Electric Corporation, 511 Wood Street, Box 868, Pittsburgh 30, Pa.
Teaching Aids for Science, Home Economics, Vocational Agriculture, Industrial Arts, Westinghouse Electric Corporation, School Service, 306 Fourth Avenue, Box 1017, Pittsburgh 30, Pa.
U. S. Government Films for School and Industry, Castle Films, Division of United World Films, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

Film Titles

Brick and Stone Masonry, Society for Visual Education, Inc., 100 East Ohio Street, Chicago, Ill., 35 mm., silent, \$2.00. Transportation charged both ways.
Cabinetmaking, Society for Visual Education, Inc., 100 East Ohio Street, Chicago, Ill., 35 mm., silent, \$2.00. Transportation charged both ways.
Carpentry, Society for Visual Education, Inc., 100 East Ohio Street, Chicago, Ill., 35 mm., silent, \$2.00. Transportation charged both ways.
Cement Finisher, Society for Visual Education, Inc., 100 East Ohio Street, Chicago, Ill., 35 mm., \$2.00. Transportation charged both ways.
First Steps in First Aid, U. S. Department of the Interior, Bureau of Mines, Washington 25, D. C., 16 mm., sound, 31 minutes, free. Transportation charged both ways.

- How to Finish Plywood*, Douglas Fir Plywood Association, 205 East 42nd Street, New York, N. Y., 35 mm., sound, free. Transportation charged both ways.
- Painters and Decorators*, Society for Visual Education, Inc., 100 East Ohio Street, Chicago, Ill., 35 mm., silent, \$2.00. Transportation charged both ways.
- Painting and Decorating*, University of Wisconsin, Bureau of Visual Education, Extension Division, Madison 6, Wis., 16 mm., sound, 11 minutes, \$1.25. Transportation charged both ways.
- Plasterers*, Society for Visual Education, Inc., 100 East Ohio Street, Chicago, Ill., 35 mm., silent, \$2.00 each. Transportation charged both ways.
- Plumbers and Steamfitters*, Society for Visual Education, Inc., 100 East Ohio Street, Chicago, Ill., 35 mm., silent, \$2.00. Transportation charged both ways.
- Plumbing*, University of Wisconsin, Bureau of Visual Education, Extension Division, Madison 6, Wis., 16 mm., sound, 11 minutes, \$1.25. Transportation charged both ways.
- Story of Rock Wool Home Insulation*, U. S. Department of the Interior, Bureau of Mines, Pittsburgh, Pa., 16 mm., sound, free. Transportation charged both ways.
- Veneering for the Homecrafter*, Albert Constantine & Son, 797 East 135th Street, New York, 16 mm., silent, 35 minutes, \$1.00. Transportation charged both ways.

5 *Equipment and Supplies*

HOW TO SELECT EQUIPMENT



The Industrial Arts teacher is frequently called on to recommend replacements for worn-out equipment, hand tools, and supplies, or is consulted as to the purchase of new equipment for the shop. No two schools have the same budget, physical plant, or educational program; therefore, all planning of tools, equipment, and supply needs must be made to fit local needs and resources.

Some questions with regard to specific factors to be considered in selecting the quantity and the type of equipment are:

1. Does the equipment have definite application in carrying out the objectives, scope, and content of the course of study?
2. Will the shop serve junior high, senior high, or both groups?
3. What activities will be taught?
4. Is the size of the class proportionate to the physical plant?
5. What funds are available?
6. Is the equipment suitable for the space available?
7. Is the equipment of modern design and can it be easily maintained?
8. Does the equipment have adequate safety devices?
9. Is the equipment mechanically designed for safety under ordinary operating conditions?
10. Is the equipment flexible; that is, can it be adapted to other uses?
11. Has the electric supply been taken into consideration in selecting equipment?

Example of Specifications

..... HIGH SCHOOL

.....
TOWN OR CITY STATE

TOOL AND EQUIPMENT LIST 1951-52

<i>Item</i>	<i>Quantity</i>	<i>Unit</i>	<i>Catalog No.</i>	<i>Name and Description of Item</i>	<i>Unit Cost</i>	<i>Total Cost</i>
1	1	each	57-207	Delta, 6" jointer (or equal). Floor model type. Over-all dimensions: length 42½", width 22¾", height from floor to jointer, 34"; tables 37½" over-all, each surface 17¼". Capacity: planes 6" wide, rabbets ½" deep. Cutterhead: 2½" diameter with three high speed steel blades dynamically balanced. Motor: Heavy duty, ½ H.P. 110/220 volts AC current, 60 cycle with starting switch and switch rod. Complete with all belts, motor, pulley, steel stand, belt guard, front safety knife guard, 2-way tilting fence with dual control.		
2	2	doz.	#20	Stanley, screwdrivers, 10" blade.		
3	5	each	#65	Stanley, gauge, marking, hardwood with brass face plates, graduated stem.		

How to Specify and Order Equipment

When making purchases of shop tools, equipment and supplies, it is essential that complete written specifications be prepared to submit to distributors for bidding purposes. Shop instructors will be furnished, upon request, with catalogs by the manufacturers of hand tools, power tools, and other kinds of equipment. These catalogs contain complete descriptions of each item and a catalog number identification. Most distributors use the same descriptions and numbers as those in the manufacturer's catalog (see page 44).

Each item on the specification sheet or order sheet should list all necessary information. Items should be listed uniformly and should contain the following:

1. Item number
2. Quantity desired
3. Unit of measure
4. Catalog number
5. Name of item
6. Complete description of item—size, color, electrical current and accessories

Specifications should ordinarily be written around a specific piece of equipment which comes closest to the teacher's requirements. In this case write the words "or equal" following the item, or include the phrase in "Instructions to Bidders."

Storage and Control of Tools, Supplies, and Projects

The storage and arrangement of the tools depend largely on the physical layout of the shop, types of activities, size of class, money available, and the ease with which the tools can be checked at the end of the shop period.

Present trends are away from the traditional tool room in favor of the open tool panel. The tool panel is fastened to the wall and contains tools normally used in the particular work area. The panel has a light background on which is painted a silhouette of each tool. This method of storage saves time for the pupil in obtaining and returning tools and facilitates the teacher's task in checking them. Additional suggestions on tool control can be found in *Industrial Arts in Pennsylvania*, Bulletin 331, Department of Public Instruction, pages 91-93.

Providing storage space for consumable supplies is an important factor in the planning of building facilities for Industrial Arts education. The comprehensive general shop ordinarily requires a dry and well-lighted room for the storage of supplies and projects.

Racks should be provided for the storage of lumber and sheet metal. Miscellaneous supplies can be stored in metal storage cabinets. Bins and shelves should also be provided for the storage of unfinished jobs. In small shop areas additional storage space can be secured by using work benches with locker-type bases.

How to Keep an Inventory

Many different methods of keeping an inventory are used in Industrial Arts shops. The type and form used depend somewhat on the local school organization. The important factor is that the Industrial Arts teacher is responsible to the administrative official of the school for a periodic, accurate accounting of all shop tools and materials. The advantages of keeping an accurate inventory are many, including:

- A periodic check on the condition and quantity of tools and materials.

- Information at all times as to how much stock is on hand.

- Accurate information concerning the amounts used during the term.

- Basis for determining amounts needed for the new term.

- Justification for quantities requisitioned.

A suggested inventory form is shown on page 46. Each item should be listed, giving as complete a description as possible. Near the close of the school term the purchasing official of the school will furnish for the *Received* column, the quantities of new items purchased during the current year. This information can easily be secured from the purchase orders. At the close of the school year the teacher checks and lists quantities in the column *On Hand at End of Term* or in one of the *Expended* columns. Then the quantities are checked against quantities listed on the inventory of the previous year, and any discrepancies are checked. When the new school term opens, the same inventory is checked and quantities are recorded in the column *On Hand at Beginning of Term*.

Equipment and Supply List

The equipment and supplies recommended in this bulletin are based on the minimum requirements for Home Mechanics for *five students*, in a comprehensive general shop. A large number of students can be accommodated by increasing the amounts proportionately. The prices of tools, equipment, and supplies given in this bulletin are as of January 1, 1952, and are therefore subject to fluctuation. Where a particular manufacturer's name is specified, it should not be taken for granted that it is necessarily preferred or recommended over another manufacturer's products.

EQUIPMENT LIST¹

1 Auger bit set, #4 to #16	\$9.90	1 Expansion bit, 7/8" to 3"	\$2.35
1 Blowtorch	8.47	1 File card	.75
<i>Brushes</i>			
1 wallpaper paste	.98	<i>Files</i>	
1 wallpaper smoothing	.93	1 auger bit, 7"	.50
<i>Calipers</i>			
1 outside, 4"	1.80	1 flat, double cut, 2nd cut, 10"	.56
1 outside, 6"	2.09	1 half-round, smooth, 8"	.61
1 inside, 4"	1.80	1 half-round, 2nd cut, 10"	.69
1 inside, 6"	2.09	1 mill, smooth, 8"	.36
1 Caulking gun	2.30	1 mill, 2nd cut, 10"	.44
1 Center punch, 5/16" x 4"	.15	2 slim taper, 6"	.48
<i>Chisels</i>			
1 butt, 1/4"	1.67	1 Flush tank	10.00
1 butt, 3/8"	1.67	1 Furnace, gas, double burner, #2	18.21
1 butt, 1/2"	1.67	1 Gauge, marking	1.10
1 butt, 3/4"	1.83	1 Goggles	2.53
1 butt, 1"	2.00	<i>Hammers</i>	
1 butt, 1 1/2"	2.58	1 ball peen, 4 oz.	1.00
1 cold, 5/8"	.38	1 ball peen, 12 oz.	1.10
<i>Clamps</i>			
2 bar, 2'	8.40	2 claw, 16 oz.	4.48
2 bar, 3'	9.00	1 riveting, 8 oz.	1.48
2 bar, 4'	10.00	2 Hand screw, adjustable, 6"	4.10
2 C, 3"	2.00	2 Hand screw, adjustable, 8"	4.90
2 C, 4"	2.40	1 Knife, linoleum	.37
2 C, 5"	3.00	1 Level, 24"	6.25
1 Dividers, 6"	2.75	1 Mallet, rawhide, 1 1/2" diameter	1.00
<i>Drills</i>			
1 automatic, push	2.50	1 Nail set	.25
1 hand, 1/4" capacity	2.00	2 Oil can, 1/3 pint, 4" nozzle	.84
1 high-speed, 1/16" to 1/2" by 32nd's	12.00	1 Pipe cutter	7.50
		1 Pipe stock and die, ratchet type, 1/2"	6.56
		1 Pipe vise	5.98

¹ List prices as of January 1, 1952.

1	Plane, block, 7"	2.25
1	Plane, jack, 14"	5.00
1	Plumb bob .....	.50
1	Putty knife .....	.65
1	Rule, steel, 24"	1.62
2	Rule, zigzag, 6'	2.00

Saws

1	back, 12"	2.75
1	compass .....	.69
1	coping	1.03
1	crosscut, 24", 10 teeth to the inch	4.96
1	hack	2.00
1	rip, 24", 5½ teeth to the inch	4.96
1	Scraper, wood, 1½" .....	.20
1	Scraper, wood, 2½" .....	.35

Screwdrivers

1	plastic handle, 4" .....	.79
1	plastic handle, 6"	1.04
1	plastic handle, 8"	1.33
1	spiral, automatic	3.67
1	Shears, paper trimming, 8"	2.00
1	Soldering iron, electric	6.48

Squares

1	combination, 12" blade ..	1.60
1	combination, 6" blade ..	1.35
1	framing	2.50
1	Stone, carborundum, combination, 8" x 2" x 1" ..	1.58
1	Tin snips	3.50

Trowels

1	brick, 8"	2.25
1	cement-finishing, 12" ..	2.93
1	linoleum-laying .....	.29
1	pointing, 5" .....	.83
1	Wallpaper scraper .....	.60
1	Wallpaper seam roller ....	.45
1	Wheel knife .....	.50

Wrenches

1	crescent adjustable, 8" ..	1.23
1	pipe, 14"	4.50
1	set, detachable socket, 7/16" to 7/8"	11.33

Total\$260.46

CONSUMABLE SUPPLY LIST¹

1	gal.	Alcohol	\$1.00
3	ea.	Battery, dry cell, 1½ volts	1.80
4	ea.	Bell, door	2.50
<i>Bolts</i>			
100	ea.	carriage, assortment	1.25
100	ea.	machine, assortment	1.38
<i>Brads, wire</i>			
1	lb.	¾", #18 .....	.36
1	lb.	1", #18 .....	.33
1	lb.	1¼", #18 .....	.30
200	ea.	Brick, new	8.00
<i>Brushes</i>			
3	ea.	flat, 2"	3.00
2	ea.	flat, 3"	2.25
3	ea.	oval sash, 1⅝" ..	1.20
25	ft.	Cable, BX, 2-wire ..	2.99
2	ea.	Cap, galvanized, ½" .....	.20
1	bag	Cement	1.50
6	ea.	Clamp, hose, brass ..	.90
10	ft.	Conduit, ½", rigid ..	1.00

12	ea.	Connectors, box ..	1.08
1	roll	Cord .....	.20
50	ft.	Cord, 1 a m p , 2 - strand, 18-gauge ..	2.00
100	ea.	Cotter pins, spring, assortment .....	.40
<i>Couplings</i>			
2	ea.	copper, ⅜" .....	.20
2	ea.	galvanized, ½" ..	.16
2	ea.	water hose, brass ..	.96
1	ea.	Dropcloth, 6' x 12' ..	4.00
<i>Elbows</i>			
2	ea.	copper, 90°, ⅜" ..	.20
2	ea.	galvanized, 90°, ½" .....	.30
50	shts.	Emery cloth, #0 ..	4.68
4	qts.	Enamel	5.50
2	qts.	Enamel undercoat ..	3.00
1	ea.	Faucet .....	.98
2	ea.	Fuse, plug, 15 amp ..	.12
2	pt.	Glue, cold	1.76
1	bag	Lime .....	.90
1	ea.	Lock, mortise	3.25
12	ea.	Locknuts, ½" conduit .....	.12

¹ List prices as of January 1, 1952.

<i>Nails</i>				1	gr.	flat head, 1½",	
2	lbs.	common, 4d	.22			#8	.66
2	lbs.	common, 6d	.22	1	gr.	flat head, 2" #8	.80
2	lbs.	common, 8d	.22	1	gr.	round head, ¾",	
2	lbs.	finishing, 2d	.24			#6	.46
2	lbs.	finishing, 4d	.24	1	gr.	round head, 1",	
2	lbs.	finishing, 6d	.24			#6	.53
2	lbs.	finishing, 8d	.24	1	gr.	round head, 1¼",	
1	lb.	wire, flat head,				#8	.65
		¾", #18	.36	1	gr.	round head, 1½",	
1	lb.	wire, flat head,				#8	.72
		1", #18	.33	1	gr.	round head, 2",	
1	lb.	wire, flat head,				#8	.88
		1¼", #18	.30	3	ea.	Shades, window	3.00
3	ea.	Nipple, galvanized,		2	gal.	Shellac, white	8.50
		½"	.30	2	ea.	Socket, push-	
<i>Oil</i>						through, brass	.60
2	qt.	cutting	.40	2	lbs.	Solder, acid core	1.92
1	gal.	lubricating,		100	ea.	Staples, insulated	.22
		medium	1.25	<i>Steel Wool</i>			
2	ea.	Outlet box, 3¼"		2	lbs.	#00	1.16
		octagon	.40	2	lbs.	#1	.86
<i>Paint</i>				<i>Switches</i>			
2	qt.	aluminum	2.20	3	ea.	battery, single	
3	gal.	outside	15.00			pole, single	
<i>Paper</i>						throw	.90
50	ea.	garnet, #00	2.56	1	ea.	feed-through	.31
100	ea.	garnet, #0	2.86	2	ea.	toggle, single pole	.60
100	ea.	garnet, #1	3.77	1	ea.	toggle, 3-way	.44
50	ea.	garnet, #2	4.82	<i>Switch Boxes</i>			
<i>Paste</i>				3	ea.	cable	1.08
1	gal.	linoleum	.79	3	ea.	conduit	1.20
5	lb.	wheat	.83	<i>Tacks, Upholsterer's</i>			
1	lb.	wax	.20	1	lb.	#6	.60
10	ft.	Pipe, galvanized,		1	lb.	#10	.58
		½"	1.00	<i>Tape</i>			
1	lb.	Pipe dope	.22	3	roll	friction, ¾"	.75
5	lbs.	Plaster, patching	.30	2	roll	rubber, ¾"	1.20
<i>Plugs</i>				2	ea.	Tee, galvanized, ½"	.40
1	ea.	appliance connec-		<i>Tile</i>			
		tor	.32	50	ea.	ceramic, 4" x 4"	8.00
2	ea.	galvanized, ½"	.16	100	ft.	floor	8.00
1	box	Points, glazier's	.10	10	ft.	Tubing, copper,	
4	ea.	Push button	.96			rigid, ⅜"	1.20
10	lbs.	Putty	.70	2	gal.	Turpentine	3.50
<i>Receptacles</i>				2	ea.	Union, galvanized,	
2	ea.	duplex, 4 bind-				½"	.60
		ing screws	.40	2	gal.	Varnish remover	5.50
2	ea.	duplex, 3¼" di-		1	gal.	Varnish, rubbing	4.00
		ameter	.34	20	rolls	Wallpaper	5.00
3	ea.	plate, duplex,		<i>Washers</i>			
		plastic	.24	6	ea.	faucet, semi-hard	.12
¼	lb.	Sal-ammoniac	.17	2	lbs.	wrought iron	.21
3	bag	Sand	1.20	<i>Wire</i>			
<i>Screws, Wood</i>				3	lbs.	annunciator	2.50
1	gr.	flat head, ¾",		25	ft.	Romex, #14	.80
		#6	.41	100	ft.	TW covered, #14	1.91
1	gr.	flat head, 1", #6	.48	<hr/>			
1	gr.	flat head, 1¼",		Total			
		#8	.59				\$175.71

6 Shop Layout_____

THE PHYSICAL SETUP



Industrial Arts shop facilities (see layout on page 52) are part of the secondary school buildings. It is difficult to prepare standard Industrial Arts shop layouts for inclusion in various architectural situations.

The layout shown here is an Industrial Arts shop area including the following activities:

1. Home Mechanics
2. Electrical
3. Metal Forming
4. Woodworking
5. Sheet Metal
6. Plastics
7. Planning

Other Industrial Arts activities may be substituted to meet the needs of the particular local school situation, but electrical, metal forming, woodworking and sheet metal are important companion areas.

All areas may use the same planning, finishing, and storage facilities. The general plan, equipment, and layout of this shop are ideal and highly desirable.

The facilities of all the areas are used by pupils in Home Mechanics. This overlapping of areas is necessary because of the varied nature of activities in this course.

The total shop area is approximately 2,176 square feet. The reader is referred to companion supplementary bulletins for information concerning equipment for areas other than Home Mechanics.

